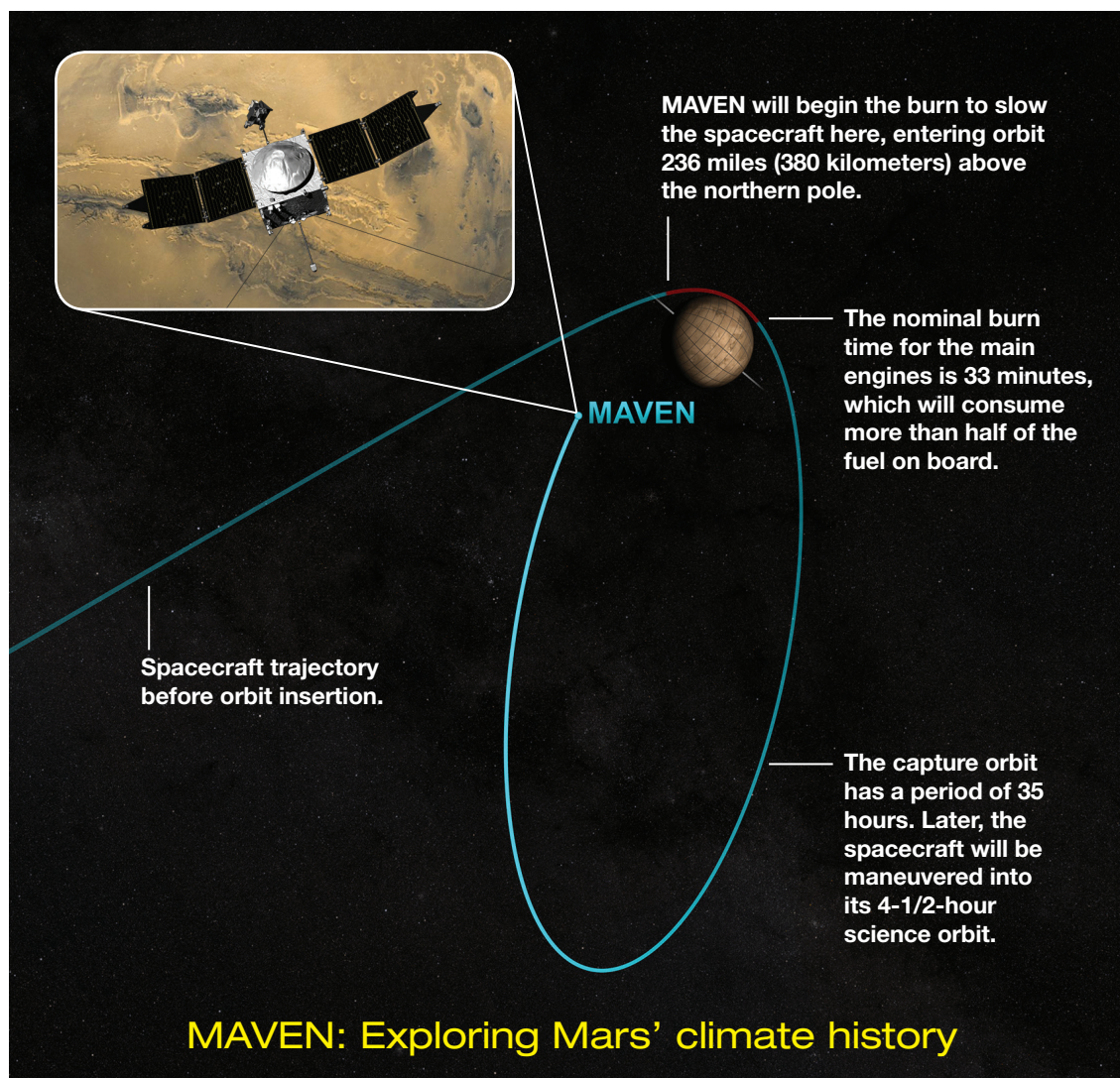


## MAVEN Orbit Insertion

### Mars Atmosphere and Volatile Evolution Mission

On September 21, 2014, the Mars Atmosphere and Volatile Evolution, or MAVEN, spacecraft will enter orbit around Mars, completing an interplanetary journey of 10 months and 442 million miles (711 million kilometers). The orbit-insertion maneuver will begin with six thruster engines firing briefly to damp out deviations in pointing. Then, the six main engines will quickly ignite and burn for 33 minutes to slow the craft, allowing it to be captured in an elliptical orbit with a period

of 35 hours. Six smaller maneuvers will be performed later to bring the highest and lowest points of the orbit to the altitudes desired for the science orbit. At its closest point, MAVEN will be flying in the upper atmosphere, about 90 miles (approximately 150 kilometers) above the surface. At its farthest point, the spacecraft will be about 3,900 miles (roughly 6,300 kilometers) above the surface, a vantage point that will allow it to observe the entire planet.



Following orbit insertion, MAVEN will begin a 6-week commissioning phase that includes maneuvering into its final science orbit and testing the instruments and science-mapping sequences. Then, MAVEN will begin its 1-Earth-year primary mission, during which it will make its key measurements.

MAVEN is the first spacecraft dedicated to exploring the tenuous upper atmosphere of Mars. The mission's combination of detailed point measurements and global observations provides a powerful way to understand the properties of the upper atmosphere. The primary mission includes five "deep-dip" campaigns, in which the altitude of MAVEN's orbit will be lowered to about 77 miles (125 kilometers). These measurements will provide information down to the top of the well-mixed lower atmosphere, giving scientists a full profile of the top of the atmosphere.

## MISSION OVERVIEW

MAVEN will help scientists understand the climate history of Mars. How did a planet once possibly habitable to microbial life turn into a cold and barren desert world? What role did the solar wind have in stripping away the atmosphere? The mission will study the upper atmosphere and ionosphere of Mars, characterizing their current states and determining the rates of loss of gas to space today. These measurements will allow researchers to extrapolate backward in time to determine the total loss throughout the planet's history. This will answer important questions about the evolution of Martian climate and the history of the planet's ability to support life.

## SCIENCE PAYLOAD

MAVEN launched from Cape Canaveral, Florida, on November 18, 2013, carrying three instrument suites. The Particles and Fields Package (PFP) contains six instruments to characterize the solar wind and the ionosphere of Mars. These are the:

- Solar Wind Ion Analyzer (SWIA)
- Solar Wind Electron Analyzer (SWEA)
- Solar Energetic Particle (SEP)

- SupraThermal and Thermal Ion Composition (STATIC)
- Langmuir Probe and Waves (LPW)
- Magnetometer (MAG)

The University of California at Berkeley Space Sciences Laboratory provided this suite and built four of its instruments, with mission partners contributing the other two. The Remote Sensing Package, built by the University of Colorado at Boulder Laboratory for Atmospheric and Space Physics, will determine global characteristics of the upper atmosphere and ionosphere. The Neutral Gas and Ion Mass Spectrometer (NGIMS), built by NASA's Goddard Space Flight Center, will measure the composition and isotopes of neutrals and ions. In addition, MAVEN carries an Electra telecommunications package that will allow it to relay data from rovers or landers on the Martian surface.

## MAVEN PARTNERS

MAVEN is led by its Principal Investigator, Dr. Bruce Jakosky, from the University of Colorado at Boulder. The university built two science instruments and is conducting the mission's science operations and leading the education/public outreach efforts. NASA's Goddard Space Flight Center in Greenbelt, Md., manages the project and built two of the science instruments. The University of California at Berkeley Space Sciences Laboratory built four science instruments for the mission. Lockheed Martin of Littleton, Colo., built the spacecraft and is performing mission operations. NASA's Jet Propulsion Laboratory, Pasadena, Calif., provides program management via the Mars Program Office, as well as data-relay telecommunications hardware and operations, navigation support, and Deep Space Network operations.

For more information, please visit our web sites: <http://www.nasa.gov/MAVEN> and <http://lasp.colorado.edu/MAVEN> or follow us on Facebook and Twitter at **MAVEN2Mars**

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